

# DEPLETED URANIUM



**HQ CENTAF BIOENVIRONMENTAL ENGINEERING**

**UNCLASSIFIED**



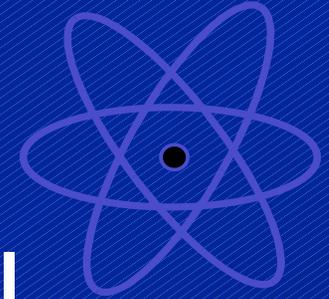
# DEPLETED URANIUM

- WHAT IS IT?
- HOW IS IT USED?
- IS IT HAZARDOUS?
  - RADIOLOGICAL
  - CHEMICAL
- WHY THE BIG DEAL?
  - KEY MESSAGES
  - BALKAN “SYNDROME”
  - STUDIES





## WHAT IS DU?



- Depleted Uranium (DU) is the material remaining after the most radioactive isotopes have been removed to enrich other natural uranium for use as nuclear fuel or in nuclear weapons
- DU is 40% less radioactive than natural uranium
- Natural uranium is all around us -- in the air, soil, in the food we eat, and the water we drink.



## Properties & Characteristics of DU

- Heavy metal (like lead, tungsten)
- 1.6 times more dense than lead
- Mildly radioactive
- Chemical toxicity (“heavy metal poisoning”)
- Highly pyrophoric (small particles can ignite spontaneously in air, especially upon impact with armor)
- “Spent” DU found on the battlefield will usually be dull black in color due to oxides on surface



## USES OF DU

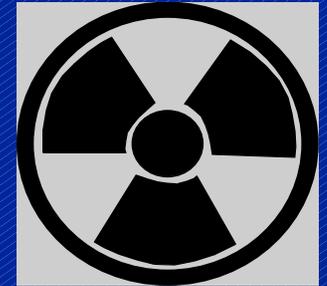


- ARMOR-PIERCING ROUNDS
- BALLAST IN AIRCRAFT & SHIPS (MILITARY & CIVILIAN)
- ARMOR FOR TANKS





# RADIOLOGICAL PROPERTIES



- ALPHA PARTICLES (PRIMARY) CANNOT PENETRATE THE SKIN
- BETA PARTICLES (SECONDARY) ARE BLOCKED BY CLOTHING
- GAMMA RAYS (VERY WEAK) ARE HIGHLY PENETRATING



# RADIOLOGICAL PROPERTIES

- WELL BELOW RAD LIMITS

- NO TRANSPORTATION OR HANDLING RESTRICTIONS BASED ON RADIATION

- POTENTIAL HAZARD ONLY FROM INHALING OR INGESTING DUST



Loading a sabot round

***Unfired or intact, DU DOES NOT pose a health risk!***



# CHEMICAL TOXICITY OF DU

- **CHRONIC LOW LEVEL EXPOSURE**
  - **DECREASED RENAL FUNCTION (ANIMAL STUDIES)**
  - **POTENTIAL INCREASE RISK OF LUNG CANCER (URANIUM MINERS)**
  - **NO OBSERVED KIDNEY PATHENOGENESIS (URANIUM MINERS)**
- **ACUTE HIGH LEVEL EXPOSURE**
  - **RENAL FAILURE (URANIUM MILL ACCIDENT)**



# WHY THE BIG DEAL?

- **LOTS of Misinformation Out There**

**Rumor**

**Press**

*Information  
Warfare*

**Balkan  
“Syndrome”**

- **Consistent, Fact-Based Messages**

**Health & Safety Is Our Foremost Concern**

**DU Is Safe**

**DU Munitions Help Win Conflicts & Save Lives**



# STUDIES ON DU - HUMAN

- **VA STUDY ON PERSONNEL WITH SHRAPNEL**
  - **NO ADVERSE REACTIONS**
  - **SUBTLE PERTURBATIONS IN REPRODUCTIVE SYSTEM & CNS**
  - **SLIGHT ELEVATIONS IN URINARY URANIUM**
  - **BABIES FATHERED HAVE BEEN HEALTHY**
- **RAND CORP - NO RAD HEALTH EFFECTS OR KIDNEY DISEASE FROM DU**
- **INSITITUTE OF MEDICINE - NO CAUSE-EFFECT RELATIONSHIP BETWEEN RENAL DYSFUNCTION/LUNG CANCER & EXPOSURE TO URANIUM**



## **LEUKEMIA & DU?**

- **NO EVIDENCE OF CORRELATION ANYWHERE**
- **LEUKEMIA IS MOST COMMON CANCER IN MALES 15 TO 39 YEARS OLD**
- **SMOKING IS THE SINGLE GREATEST KNOWN CAUSE OF LEUKEMIA**



## **MEDICAL SURVEILLANCE FOR DU?**

- **MEDICAL SURVEILLANCE IS NOT INDICATED EXCEPT FOR HIGH-RISK POPULATION**
  - **SOMEONE WITH EMBEDDED SHRAPNEL**
  - **RESCUE PERSONNEL FROM DU-HIT VEHICLES**
  - **RECOVERY PERSONNEL FROM DU-HIT VEHICLES**
- **LABORATORY TEST**
  - **ONLY ONE SPECIFIC TEST, URINE URANIUM**
    - **MUST BE DONE WITHIN DAYS OF EXPOSURE**
    - **GIVES NO INDICATION OF PATHOLOGY**
  - **ALL OTHER TESTS CARRY UNACCEPTABLE FALSE POSITIVE RATES - LEADS TO HIGH FALSE POSITIVE RATES IN LOW RISK POPULATIONS**



# LABORATORY SCREENING (NON-INVASIVE)

Test	Measurement of internal dose	Measurement of biologic effect	Sensitivity	Specificity to Uranium
Urine Uranium	+	-	+	+
Urine Protein	-	+	+	-
Urine amino-acids	-	+	+	-
Urine beta-2-microglobulin	-	+	++	-

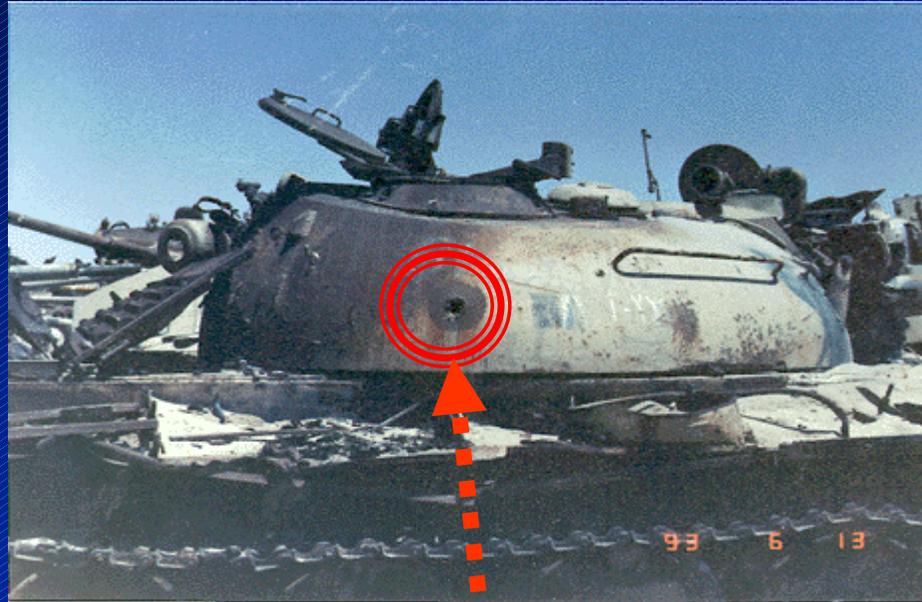


# STUDIES ON DU - ENVIRONMENTAL

- **VERY LITTLE, IF ANY, DU REMAINS AFTER FIRING**
  - **ARMY UNABLE TO FIND ANYTHING IN KOSOVO (FARM LAND)**
  - **United Nations FOUND VERY LITTLE AT IMPACT SITES ON HARD SURFACES**
  - **REMAINS LOCALIZED; WASHED AWAY AFTER FIRST RAINS**
  - **UNLIKELY TO AFFECT GROUND WATER**
  - **DIFFICULT TO RESUSPEND IN THE AIR**



# DU CONTAMINATION SOURCES



Iraqi tank hit by DU

- Destroyed or damaged combat vehicles
- Penetrator Fragments

***A small, neat hole is a tell-tale sign of a DU hit...but only a RADIAC meter can confirm DU contamination***



# OPERATING IN A COMBAT ENVIRONMENT



## **"STOP STUPID STUFF!"**

- Avoid knocked-out combat vehicles
- DON'T pick up spent DU rods with bare hands or keep them as souvenirs!

TO KEEP EXPOSURES AS LOW AS POSSIBLE, DOD RECOMMENDS:

- WASH HANDS AFTER HANDLING EXPENDED MUNITIONS
- DON'T ENTER KNOCKED-OUT TARGETS WITHOUT PERMISSION



## ***“How Do I Protect Myself?”*** **FOR RECOVERY OPERATIONS PERSONNEL**



**RADCON personnel atop  
burned-out M1A1, Camp  
Doha, 1991**

- **COVER EXPOSED SKIN**
- **WASH HANDS TO AVOID INGESTION**
- **RESPIRATORY PROTECTION IF RESUSPENDING LARGE AMOUNTS OF DUST**
- **IF POSSIBLE, AVOID AREAS CONTAINING SUSPECT HAZARDS**



# CONCLUSION

- **HEALTH & SAFETY IS OUR FOREMOST CONCERN**
- **DU IS SAFE**
- **DU MUNITIONS HELP WIN CONFLICTS & SAVE LIVES**

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**QUESTIONS?**